

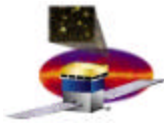
GLAST Large Area Telescope Calorimeter Subsystem

11.0 Mechanical Ground Support Equipment

Paul V. Dizon
Naval Research Lab, Washington DC
Calorimeter Lead Mechanical Systems Engineer

paul.dizon@nrl.navy.mil
(202)-404-7193

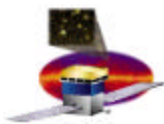




NRL Mechanical GSE

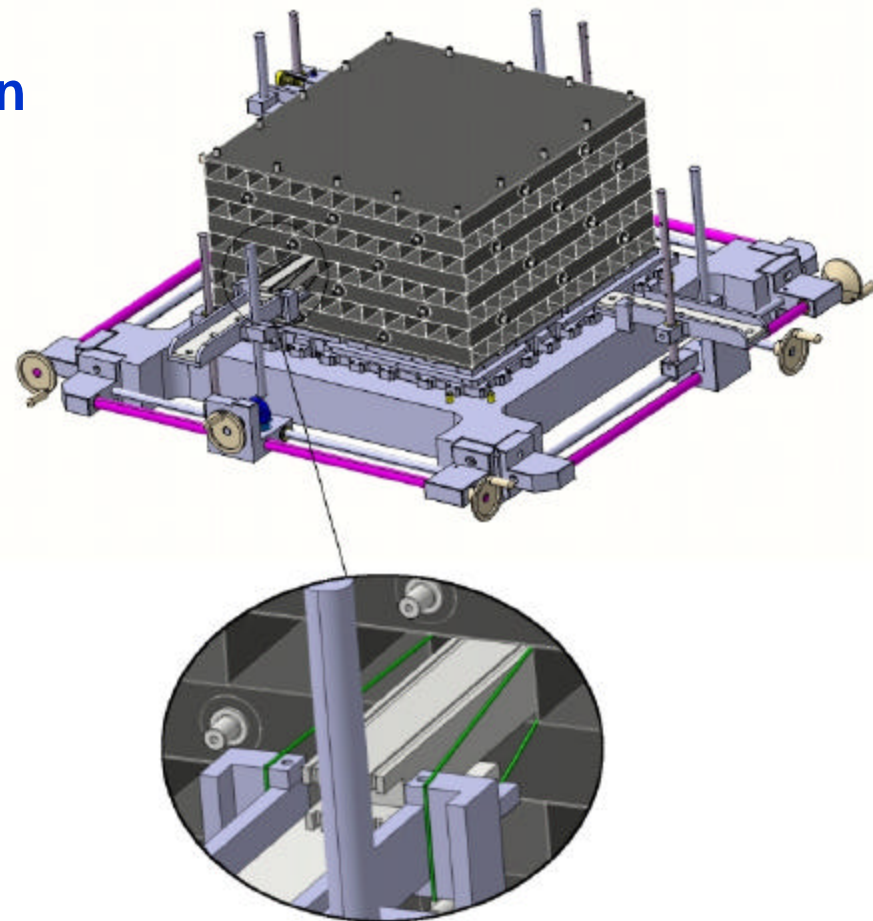
SUPPORT EQUIPMENT	DRAWING NUMBER	STATUS
ASSEMBLY TOOLING		
- CDE Insertion Tooling		Modification to Current EM Design is On-Going
CDE Insertion Tooling. Top Level Assembly	LAT-DS-01521	
- PEM Assembly Tooling		Fabrication is Complete
AFEE Board Integration Tooling	LAT-DS-01520	
TEST FIXTURES		
- TVAC Test Fixture		Detailed Design is Complete. Fabrication is On-Going
CAL Thermal Vacuum Test Fixture, Top Level Assembly	LAT-DS-01361	
CAL TVAC Test Fixture, Plate, Base	LAT-DS-01362	
CAL TVAC Test Fixture, Bar, Support	LAT-DS-01363	
CAL TVAC Test Fixture, Plate, Side	LAT-DS-01364	
CAL TVAC Test Fixture, Plate, Top	LAT-DS-01365	
CAL TVAC Test Fixture, Isolator, Base	LAT-DS-01366	
CAL TVAC Test Fixture, Isolator, Side	LAT-DS-01367	
CAL TVAC Test Fixture, Isolator, Top	LAT-DS-01368	
CAL TVAC Test Fixture, Washer, Shoulder	LAT-DS-01369	
- Vibration Test Fixture		Detailed Design is Complete. Fabrication is On-Going
CAL Vibration Test Fixture, Top Level Assembly	LAT-DS-01514	
CAL Lift Fixture, Plate, Base	LAT-DS-01515	
CAL Lift Fixture, Channel, Short	LAT-DS-01516	
CAL Lift Fixture, Channel, Long	LAT-DS-01517	
CAL Lift Fixture, Plate, Short	LAT-DS-01518	
CAL Lift Fixture, Plate, Long	LAT-DS-01519	
- EM Translation Stage	N/A	BTEM Fixture Exists
GROUND SUPPORT EQUIPMENT		
- EM Lift Fixture		Fabrication of EM Fixture is Complete
CAL Lift Fixture, Top Level Assembly	LAT-DS-01526	
CAL Lift Fixture, Corner Fixture	LAT-DS-01527	
CAL Lift Fixture, Spreader Bar	LAT-DS-01528	
- EM Handling Fixture		Fabrication of EM Fixture is Complete. Design of Flight Fixture is Complete.
CAL Handling Fixture, Top Level Assembly	LAT-DS-01523	
CAL Handling Fixture, Base Plate	LAT-DS-01524	
CAL Handling Fixture, Posts	LAT-DS-01525	
- CAL Shipping Container	LAT-DS-01522	Preliminary Design is On-Going
- Rotation/Assembly Stand	N/A	Modifications to Existing Fixture is Complete

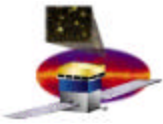




Assembly Tooling

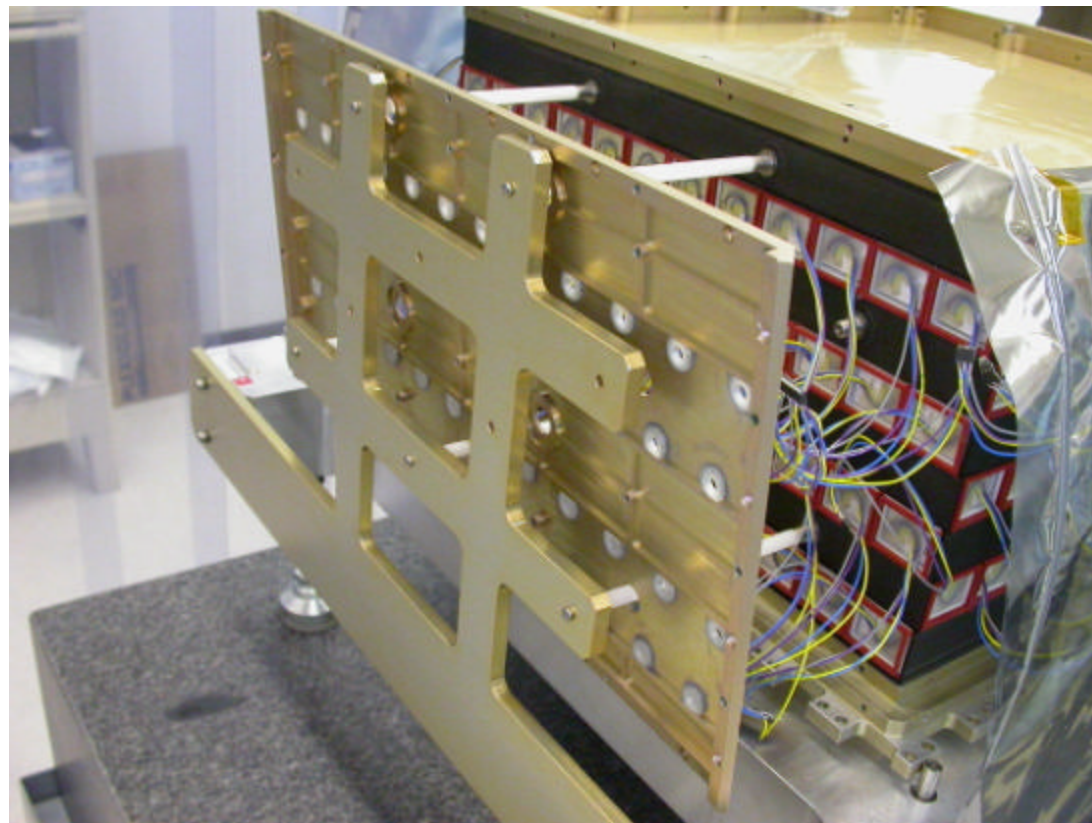
- ❑ CDE Insertion Tooling
 - Secures Elastomeric Cords in Tension
 - Supports and Positions CDE During Insertion

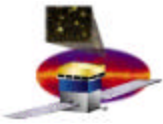




Assembly Tooling

- ❑ **PEM Assembly Tooling**
 - **Supports Close-Out Plates During PEM Assembly**
 - **Supports AFEE Cards During PEM Assembly**

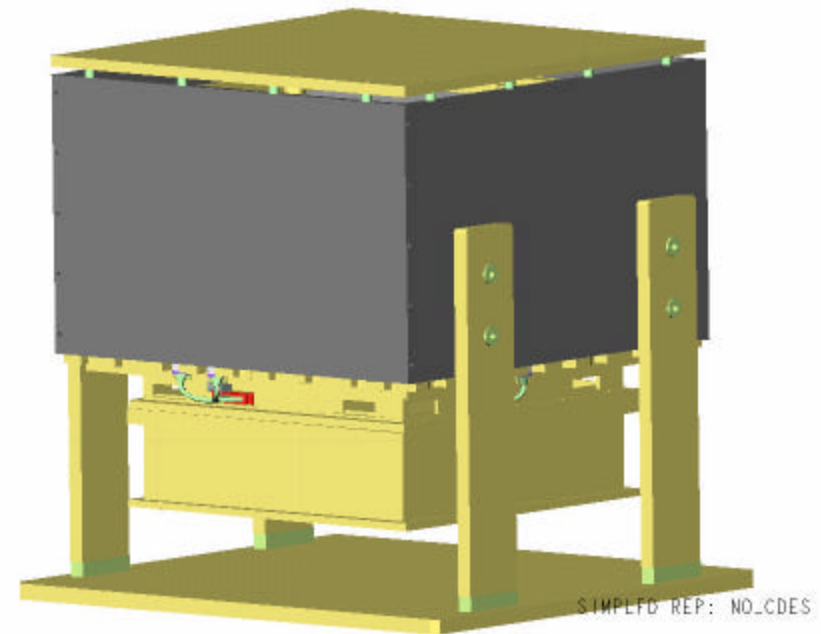


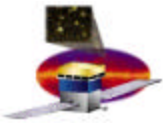


Test Fixtures

□ TVAC Test Fixture

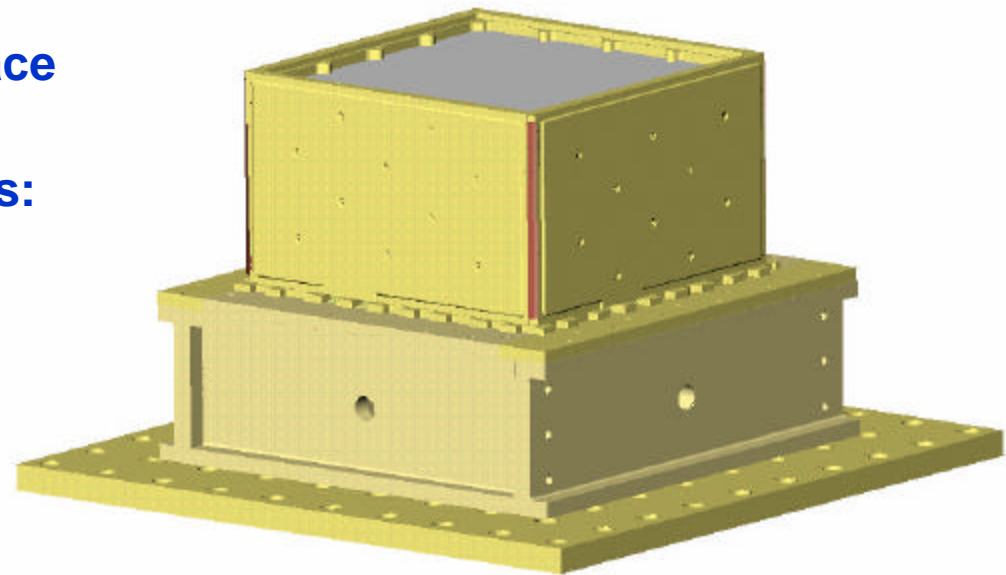
- Supports CAL Module-TEM/TPS Assembly during TVAC Testing
- Represents Inside Surface of LAT-Grid
- Designed For Cold-Biased Test Environment. Heaters Attached to Fixture Control Temperature.
- Cold Plate Attached to TEM/TPS Represents X-LAT Plate

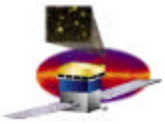




Test Fixtures

- ❑ **Vibration Test Fixture**
 - Supports CAL Module-TEM/TPS Assembly
 - Attachment Represents Flight CAL Tab-Grid Interface
 - Used for All Structural Environment Test Activities:
 - Low-Level Sine Sweep
 - Random Vibration
 - Sine Burst



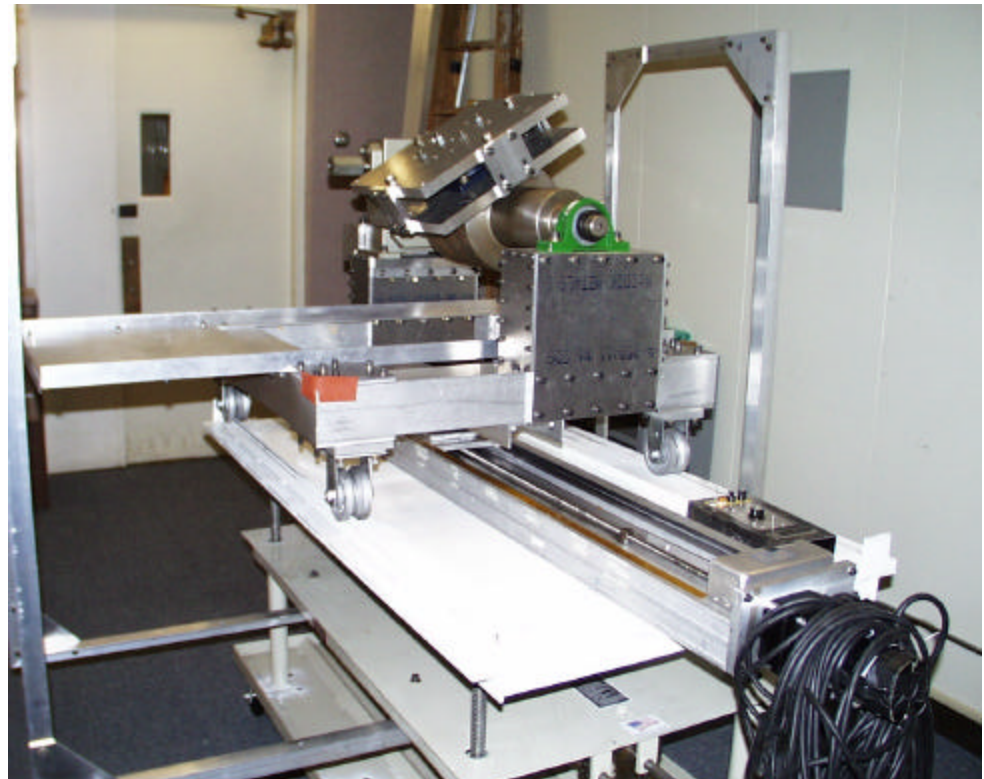


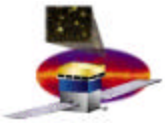
Test Fixtures

- ❑ **EM Translation Stage**
 - **Rotation/Assembly Stand Attaches to System**
 - **Allows Mapping of EM in Accelerator Beams**
 - **Includes Support for Ancillary Detectors**

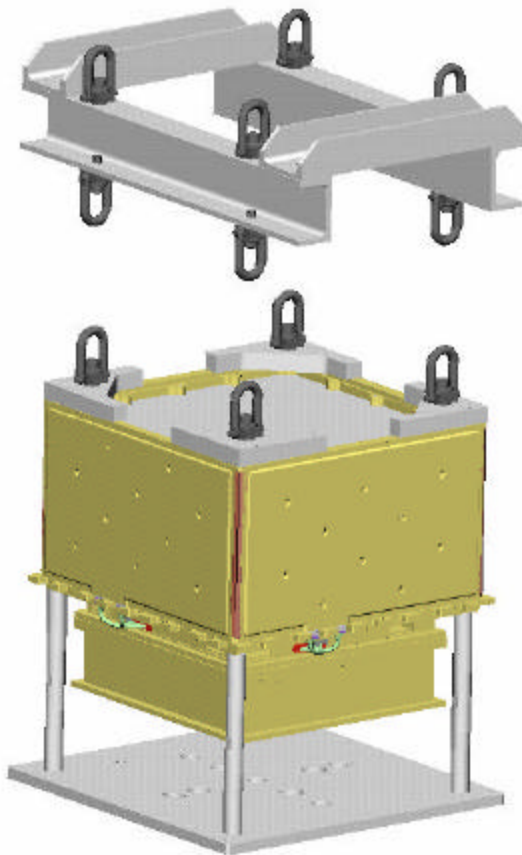
- ❑ **Requirements**
 - **>40 cm 2D Motion**
 - **<1 mm Accuracy**
 - **90 deg Pitch Rotation**
 - **<1 deg Accuracy**
 - **>120 kg Capacity**

BTEM prototype





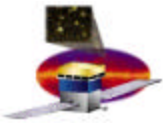
Ground Support Equipment



❑ Lift Fixture

- Distributes Lift Load During Crane Operations
- Consists of:
 - 4 Corner Brackets
 - 1 Spreader Frame
 - Nylon Slings

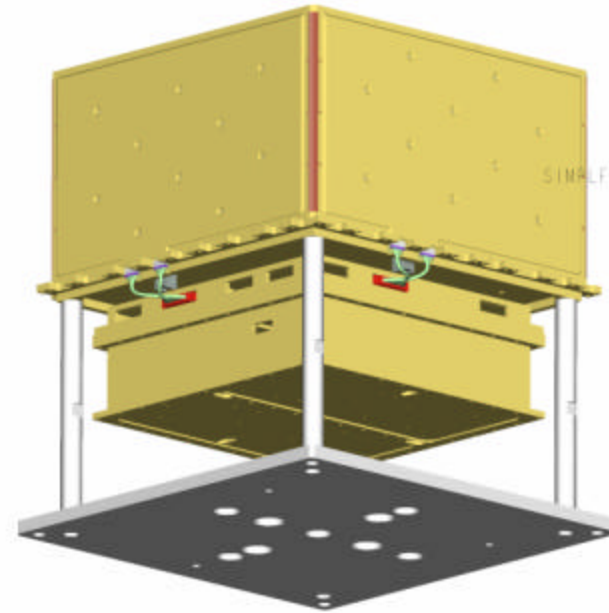


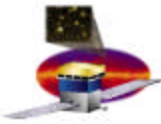


Ground Support Equipment

□ Handling Fixture

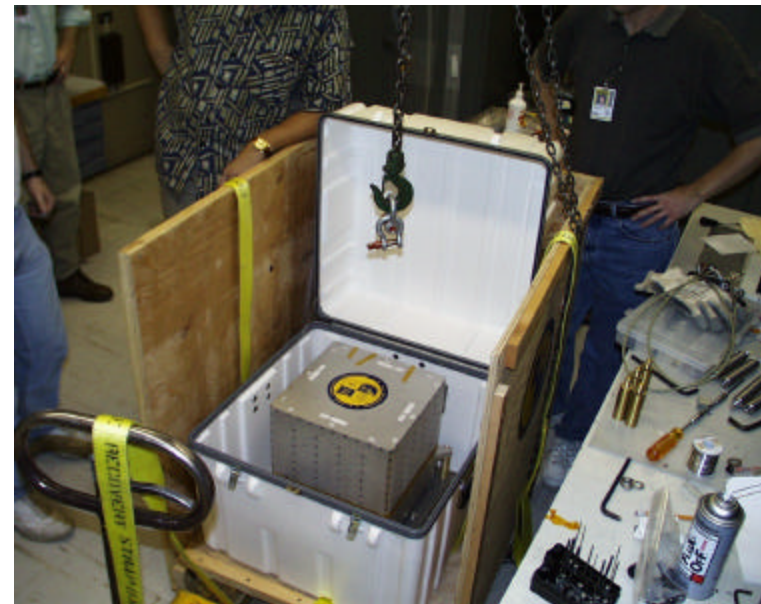
- Supports CAL Module - TEM/TPS Assembly
- Provides Interface to the Following MGSE:
 - Shipping/Storage Container for Testing and Storage
 - LAT-Rotation/Assembly Stand (NRL)
 - LAT-Grid Integration Tooling (SLAC)
 - Turn-Over Fixture
 - LAT-Grid Lift Fixture
 - LAT-Grid Alignment Tool

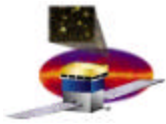




Ground Support Equipment

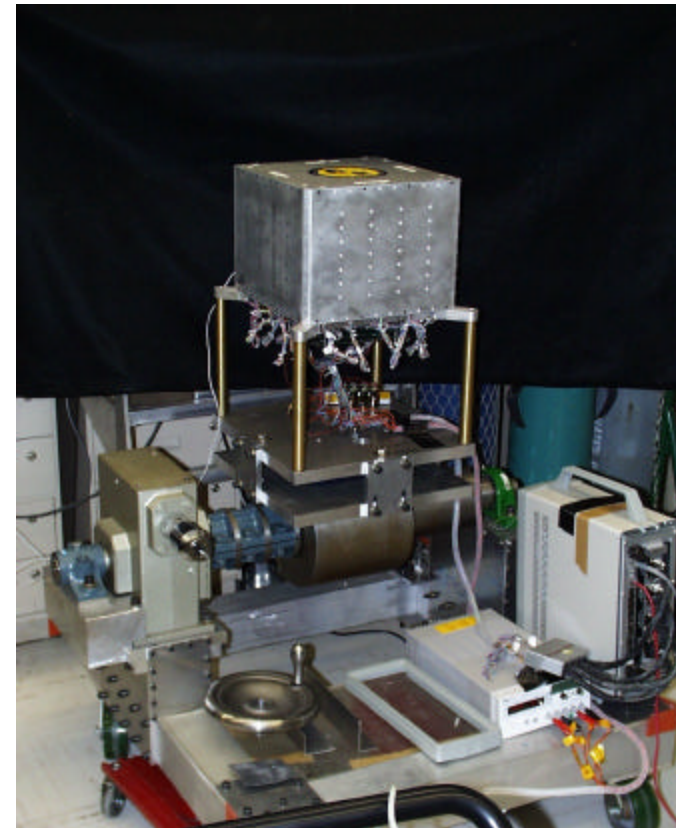
- ❑ **CAL Shipping/Storage Container**
 - **Outer Shipping Container**
 - **Wheeled Dolly with Cover**
 - **Inner Pressure Housing**
 - **Provides Dry Nitrogen Environment**
 - **Shock-Mount Suspension**
 - **1 Container per Module**





Ground Support Equipment

- ❑ **Rotation/Assembly Stand**
 - Existing Fixture - BTEM Rotation / Assembly Stand. Will be Duplicated for Flight
 - Modified to Support CAL EM Module
 - Allows Assembly Technician and Engineer Easy Access to Each Side of CAL in Horizontal, Vertical or Any Pitch
 - Used for AFEE Card Integration
 - Interfaces to EM Translation Stage to Support Beam Testing



BTEM prototype

